Calhoun: The NPS Institutional Archive

DSpace Repository

Theses and Dissertations | 1. Thesis and Dissertation Collection, all items

2006-06

Characteristics and trends of attrition from the United States Naval Academy

Bishop, James W.

Monterey, California. Naval Postgraduate School

http://hdl.handle.net/10945/2792

Downloaded from NPS Archive: Calhoun

http://www.nps.edu/library

Calhoun is the Naval Postgraduate School's public access digital repository for research materials and institutional publications created by the NPS community. Calhoun is named for Professor of Mathematics Guy K. Calhoun, NPS's first appointed -- and published -- scholarly author.

Dudley Knox Library / Naval Postgraduate School
411 Dyer Road / 1 University Circle
Monterey, California USA 93943

NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

THESIS

CHARACTERISTICS AND TRENDS OF ATTRITION FROM THE UNITED STATES NAVAL ACADEMY

by

James Bishop

June 2006

Thesis Co-Advisors: Janice Laurence
Linda Mallory

Approved for public release; distribution unlimited

THIS PAGE INTENTIONALLY LEFT BLANK

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.			
1. AGENCY USE ONLY ***(Leave blank)***	**2. REPORT DATE** June 2006	**3. REPORT TYPE AND DATES COVERED** Master's Thesis	
4. TITLE AND SUBTITLE: Characteristics and Trends of Attrition from The United States Naval Academy			**5. FUNDING NUMBERS**
6. AUTHOR(S) James W. Bishop			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000			**8. PERFORMING ORGANIZATION REPORT NUMBER**
9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A			**10. SPONSORING/MONITORING AGENCY REPORT NUMBER**
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.			
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution unlimited			**12b. DISTRIBUTION CODE**

13. ABSTRACT (maximum 200 words)

The purpose of this research was to examine and describe attrition and analyze factors that affect attrition at the United States Naval Academy. Specifically, the research attempts to identify characteristics that may signal a student's propensity to attrite from school. The intention is to determine if there are common characteristics among those who attrited from the Academy and to determine what role organizational factors and Academy experiences had on attrition. The desired end state is to identify a partial list of characteristics the Company Officer may use to flag at risk Midshipmen and when appropriate, intervene to reduce attrition. The results of the research indicate those who fail one or more physical readiness tests, females, and minorities have a greater probability of attriting from the Academy. This study summarizes the results, makes recommendations to the United States Naval Academy and for future research.

14. SUBJECT TERMS Attrition, United States Naval Academy			**15. NUMBER OF PAGES** 71
			16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT Unclassified	**18. SECURITY CLASSIFICATION OF THIS PAGE** Unclassified	**19. SECURITY CLASSIFICATION OF ABSTRACT** Unclassified	**20. LIMITATION OF ABSTRACT** UL

NSN 7540-01-280-5500 Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. 239-18

THIS PAGE INTENTIONALLY LEFT BLANK

Approved for public release; distribution unlimited

CHARACTERISTICS AND TRENDS OF ATTRITION FROM THE UNITED STATES NAVAL ACADEMY

James W. Bishop
Captain, United States Marine Corps
B.S. Business Administration, Oregon State University, 1996

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN LEADERSHIP AND HUMAN RESOURCE DEVELOPMENT

from the

NAVAL POSTGRADUATE SCHOOL
June 2006

Author: James W. Bishop

Approved by: Janice Laurence, Ph.D.
Thesis Co-Advisor

Linda Mallory, Ed.D.
Thesis Co-Advisor

Robert N. Beck
Dean, Graduate School of Business and Public Policy

THIS PAGE INTENTIONALLY LEFT BLANK

ABSTRACT

The purpose of this research was to examine and describe attrition and analyze factors that affect attrition at the United States Naval Academy. Specifically, the research attempted to identify characteristics that may signal a student's propensity to attrite from school. The intention was to determine if there are common characteristics among those who attrited from the Academy and to determine what role organizational factors and Academy experiences had on attrition. The desired end state was to identify a partial list of characteristics the Company Officer may use to flag at risk Midshipmen and when appropriate, intervene to reduce attrition. This research examined attrition for six graduating cohorts, the classes of 2000 – 2005 (N = 6905), and was conducted in three steps. First, trends and consistencies among the graduating cohorts were identified. This macro view of attrition gives the reader an overall feel for how attrition affected the different year groups. Next, relationships between factors identified through the literature and attrition were analyzed using chi-square tests. Finally, those factors identified as having a significant effect on attrition were used in a hierarchical logistical regression. The results of the regression indicate those who fail one or more physical readiness tests, females, and minorities have a greater probability of attriting from the Academy. This study summarizes the results, makes recommendations to the United States Naval Academy and for future research.

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

I. INTRODUCTION....1
A. BACKGROUND....1
B. PURPOSE....4
C. EXPECTED BENEFITS....5
D. SCOPE AND METHODOLOGY....5
1. Scope....5
2. Research Questions....5
a. Primary Research Question....5
b. Secondary Research Questions....5
3. Methodology....5
E. ORGANIZATION OF STUDY....6

II. BACKGROUND AND LITERATURE REVIEW....7
A. INTRODUCTION....7
B. THE MISSION OF THE UNITED STATES NAVAL ACADEMY....7
C. U.S. NAVAL ACADEMY ADMISSIONS....8
D. TYPES OF ATTRITION....8
1. Introduction....8
2. High School Attrition....9
3. College Attrition....10
4. Service Academy Attrition....10
5. Factors Affecting Attrition....11
a. College Grade Point Average....11
b. Physical Fitness....11
c. Gender and race....11
d. Varsity Athletics....12
e. Honor and Conduct Violations....13
f. Company Assignment....13
E. SUMMARY....14

III. DESCRIPTION OF DATA AND RESEARCH METHODOLOGY....17
A. INTRODUCTION....17
B. RESEARCH APPROACH....17
C. DESCRIPTION OF DATA....18
D. METHODOLOGY....18

IV. RESULTS....21
A. INTRODUCTION....21
B. STAGE 1: COHORT ANALYSES....21
C. STAGE 2: DATA SET ANALYSIS....25
D. STAGE 3: LOGISTIC REGRESSION....26
E. SUMMARY....28

V. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS....31

A. SUMMARY AND CONCLUSIONS 31
1. Stage 1 31
2. Stage 2 32
3. Stage 3 33
B. RECOMMENDATIONS FOR FURTHER RESEARCH 35
C. RECOMMENDATIONS TO THE U.S. NAVAL ACADEMY 36
APPENDIX: VARIABLES IN THE DATA SET FOR ANALYSIS 37
A. STAGE 1: SUPPORTING TABLES 40
B. STAGE 2: SUPPORTING TABLES 48
C. STAGE 3: SUPPORTING TABLES 52
1. Demographic Regression 52
2. Background Regression 53
3. Academy Experiences Regression 53
LIST OF REFERENCES 55
INITIAL DISTRIBUTION LIST 57

LIST OF TABLES

Table 1: Data Coding for Variables Included in the Attrition Analyses 18
Table 2: Distribution and Attrition for Midshipmen from Graduation Year Cohorts 2000-2005 22
Table 3: Comparison of Characteristics for Cohort 2005 and the Average of Cohorts 2000-2004 23
Table 4: Reason for Attrition by Cohort 23
Table 5: Class Year and Reason for Leaving Cross-Tabulation 24
Table 6: Class Year and Reason for Leaving Percentages 24
Table 7: Attrition Frequencies 25
Table 8: Independent Variable Frequency, Percentage, and Significance 25
Table 9: Hierarchical Regression Table 27
Table 10: Variable Results for the Full Model (All Variables) 28
Table 11. Variables In Data Set 37
Table 12: Graduation Year Frequencies 40
Table 13: Attrition Frequencies 40
Table 14: Graduation Year Cross-Tabulation 40
Table 15: Graduation Year Chi-Square 40
Table 16: Graduation Year Chi-Square Without 2005 41
Table 17: Cohort 2005 Minority Cross-Tabulation 41
Table 18: Cohort 2005 Minority Chi-Square 41
Table 19: Cohort 2005 Gender Cross-Tabulation 41
Table 20: Cohort 2005 Gender Chi-Square 42
Table 21: Cohort 2005 Accession Source Cross-Tabulation 42
Table 22: Cohort 2005 Accession Source Chi-Square 42
Table 23: Cohort 2005 Major Level Cross-Tabulation 42
Table 24: Cohort 2005 Major Level Chi-Square 43
Table 25: Cohort 2005 Prior Enlisted Service Cross-Tabulation 43
Table 26: Cohort 2005 Prior Enlisted Service Chi-Square 43
Table 27: Cohort 2005 Varsity Athlete Cross-Tabulation 43
Table 28: Cohort 2005 Varsity Athlete Chi-Square 43
Table 29: Cohort 2005 Failed Physical Readiness Test Cross-Tabulation 44
Table 30: Cohort 2005 Failed Physical Readiness Test Chi-Square 44
Table 31: Cohort 2005 Conduct Violations Cross-Tabulation 44
Table 32: Cohort 2005 Conduct Violations Chi-Square 44
Table 33: Cohort 2000-4 Minority Cross-Tabulation 44
Table 34: Cohort 2000-4 Minority Chi-Square 45
Table 35: Cohort 2000-4 Gender Cross-Tabulation 45
Table 36: Cohort 2000-4 Gender Chi-Square 45
Table 37: Cohort 2000-4 Accession Scource Cross-Tabulation 45
Table 38: Cohort 2000-4 Accession Source Chi-Square 46
Table 39: Cohort 2000-4 Major Level Cross-Tabulation 46
Table 40: Cohort 2000-4 Major Level Chi-Square 46

Table 41: Cohort 2000-4 Prior Enlisted Service Cross-Tabulation 46
Table 42: Cohort 2000-4 Prior Enlisted Service Chi-Square 47
Table 43: Cohort 2000-4 Varsity Athletes Cross-Tabulation 47
Table 44: Cohort 2000-4 Varsity Athletes Chi-Square 47
Table 45: Cohort 2000-4 Failed PRT Cross-Tabulation 47
Table 46: Cohort 2000-4 Failed PRT Chi-Square 48
Table 47: Cohort 2000-4 Conduct Violations Cross-Tabulation 48
Table 48: Cohort 2000-4 Conduct Violations Chi-Square 48
Table 49: Minority Frequency 48
Table 50: Minority Cross-Tabulation 48
Table 51: Minority Chi-Square 49
Table 52: Gender Frequencies 49
Table 53: Gender Cross-Tabulation 49
Table 54: Gender Chi-Square 49
Table 55: Prior Enlisted Frequency 50
Table 56: Prior Enlisted Cross-Tabulation 50
Table 57: Prior Enlisted Chi-Square 50
Table 58: Feeder Source Frequencies 50
Table 59: Feeder Source Cross-Tabulation 50
Table 60: Feeder Source Chi-Square 51
Table 61: Major Groups Frequency 51
Table 62: Major Groups Cross-Tabulation 51
Table 63: Major Groups Chi-Square 51
Table 64: Varsity Sports Frequency 52
Table 65: Varsity Sports Cross-Tabulation 52
Table 66: Varsity Sports Chi-Square 52
Table 67: Demographic Regression Variables 52
Table 68: Demographic Regression Model Summary 52
Table 69: Background Regression Variables 53
Table 70: Background Regression Model Summary 53
Table 71: Academy Experiences Regression Variables 53
Table 72: Academy Experiences Model Summary 53

ACKNOWLEDGMENTS

There are many people who have been instrumental in helping with the momentous task of completing this thesis. Without their support this project would never have come to completion.

First, thanks to my advisors Janice Laurence and Linda Mallory. Janice's expertise and sincere interest in this research were deeply appreciated; her patient editing and thorough corrections taught me much about research writing. Linda's familiarity with the data and knowledge of the statistical software gave me a solid platform from which to launch into this project. Both ladies strengths were complimentary and they were the best team I could hope for.

Next, thanks to the institutional research office. Their assistance in procuring, cleaning, and analyzing the data set was crucial to the timely completion of this project. They are a huge asset to the Naval Academy and have shown great support to the LEAD program.

Finally to my wife who has been my true strength through this process. Her patience and understanding during this project and the last ten years have been above and beyond what most could endure. She enabled me to take the time to work through the project by taking care of our two wonderful and energetic children. At times, I know she was frustrated with the long hours but her support never wavered. Thank you for being there for me during every step.

THIS PAGE INTENTIONALLY LEFT BLANK

I. INTRODUCTION

A. BACKGROUND

United States Service Academies are some of the most elite intuitions of higher learning in the world. Each year the Naval Academy selects approximately 1,200 candidates for admission from a total applicant pool in excess of 12,000 young men and women (USNA, 2003-4). Between the years of 2000-2005, 20% of each class left the Academy before graduating (USNA, 2003-4). This attrition is costly for the Naval Academy. In addition to lost investments in recruiting students, there are also costs because of lost time and energy invested in teaching, counseling, record maintenance, housing and other forms of effort in accommodating students (Mangum, Baugher, Winch, & Varanelli, 2005). Additionally, the Academy has lost the opportunity for another well-suited applicant to attend the institution. For example, in some civilian corporations, turnover costs account for about 150% of an employee's annual salary (Gale, 2002).

Previous research has examined attrition associated with "plebe" summer; the indoctrination period for incoming freshmen or plebes (Hollenbach, 2003). Plebe summer is arguably the most difficult time for Plebes during their Academy career and attrition is expected. Plebe summer is a particularly demanding time for the new Midshipmen and, although they are thoroughly screened, there is an expectation that some will quit. Further, early or expedited discharge may be less costly than later attrition.

This study is concerned with factors that affect attrition overall—throughout the four year course of study at the Naval Academy. Previous research has indicated that different predictors are associated with attrition for enlisted personnel at different points in the term of service (Laurence, Naughton, & Harris, 1995). Therefore, it is important to examine attrition at the Naval Academy beyond the early phases. Little research has focused on identifying the characteristics of those who attrite later in their Academy careers or identifying trends in attrition over the four-year period or over time. Understanding why different types of attrition occur could lead to cost saving selection solutions, counseling solutions, or other interventions to help reduce attrition.

The task of predicting who will drop out is not an easy one. The first step is to define "drop out" or attrition. Dropout is defined as premature disengagement and termination of an education (Alexander, Entwisle, & Kabbani, 2001.) For the purposes of this study, anyone who is admitted to the Academy and departs prior to graduating has dropped out or attrited from the Academy. Attrition cases can be broken into two subgroups, those that left voluntarily and those who did not leave voluntarily. After a determination has been made regarding how a student left the academy, the next step is to identify factors that may have contributed to departure. Literature related to attrition, college students, adult development, and enlisted retention, were reviewed to help establish potential predictors of attrition.

Several studies have focused on characteristics of students as they relate to their propensity to drop out of school. Magnum, Baugher, Winch, and Varanelli (2005) found that first semester GPA was one of the top three indicators of dropping out among students in civilian colleges. Scholastic aptitude is important to the students at the Naval Academy. Midshipmen must maintain a 2.0 average to graduate. Therefore, Academic Quality Point Ratio (AQPR) may be an indicator of attrition. Additionally, average AQPR may vary depending on the students' major.

Personal and social development play significant roles in an individual's college experience. According to McGaha and Fitzpatrick (2005), the underlying premise is that the personal (loneliness, interpersonal competence) and social (marginality) factors might color the students' experiences and perhaps affect their risk propensity. Women and minorities will be most affected by these factors because of their smaller numbers in the Brigade of Midshipmen. Loneliness is defined as the subjective dissatisfaction of unmet needs in the context of personal relationships (Leung, 2002; Neto & Barros, 2000). Women may be some of the loneliest students at the Academy. Between the years of 2000 to 2005, they constituted an average of 16.5% of the Brigade (USNA, 2003-4). Miller and deWinstanley (2002) reported that competent undergraduates had greater recall of problem-solving conversations with same-sex peers. This indicates students prefer to participate in and do better with a support structure consisting of members of the same sex. Therefore, women may be at greater risk of attrition because of their smaller numbers.

Social factors also affect minorities. In the same years listed above for women, minorities accounted for an average of 17.9% of the Brigade (USNA, 2003-4). Like women, their small numbers make them more susceptible to personal and social isolation factors. According to McGaha and Fitzpatrick (2005), minorities' experience is often the same; marginalized students perceive their college community is not invested in them and they become less invested in the college experience. Rankin and Reason (2005) also found that students of color experienced harassment, defined as any offensive, hostile, or intimidating behavior that interferes with learning, at higher rates than White students; although White female students reported higher incidences of gender harassment. Thus, personal, social, and marginalization factors might be positively related to risk. These psychological variables are not available for analysis, therefore, gender and ethnic background should be considered as proxies or indirect factors that may affect attrition at the Academy.

Personal and social development are implicated in honor and conduct violations as they relate to attrition as well. Low, Williamson, and Cottingham (2004) studied indicators and predictors of student law breaking behaviors. Although conduct and honor violations are not necessarily law breaking activities in the strictest sense, they could be considered as a form of organizational delinquency. Many university students are still exploring alternative life goals as part of their identity development (Erickson, 1968; Marcia, 1993; Waterman, 1985). Many became involved in activities as a means to impress peers to fit into their new social crowd (Low, et. al, 2004). Therefore, those who have a greater number of honor and conduct violations may have a more difficult time adjusting to Academy life and an increased risk of dropping out.

Varsity athletics is another area that may shed some light on a student's propensity to drop out. In his thesis, Harvey (2003) failed to find a statistically significant relationship between performance at the Academy and participation in varsity athletics. However, varsity athletics may have an impact on retention. The college years are a time when students develop and practice their interpersonal relations, leadership skills, and general personal development (Pascarella & Terenzini, 2005). Varsity athletics may assist a student in the development of these skills and should be considered when examining attrition.

Each company likely has a unique culture and will affect how a new student assimilates into the Academy environment. The company can be key to developing cohesion and commitment and hence is the first place a student can help find a balance to cope with the demands of the Academy. Pizzolato's (2004) research indicated that students found social relationships to be a beneficial coping strategy and instrumental in reaching emotional clarity and finding solutions to challenging situations. If a company has a supportive culture and leadership it may have a significant impact on whether the student stays.

Finally, "legacy" and physical fitness are two variables that may also affect the students' propensity to drop out. Legacy may provide insight into the Academy experience. The Naval Academy is rich in tradition and those Midshipmen who have parents that are alumni may be less likely to attrite than those who do not have alumni parents. Second, Midshipmen must maintain physical fitness standards while at the Naval Academy to graduate. Those who have a difficult time maintaining the standard may have a higher probability of dropping out of the Academy. These factors will be explored in this research to determine if any of them predict a students' propensity to drop out.

B. PURPOSE

The purpose of this research is to examine and describe attrition and analyze internal and external influences affecting attrition at the Naval Academy. Research on turnover in industry and attrition in the enlisted ranks suggests that the seemingly simple criterion is actually more complex. If attrition is not a unitary construct, then its predictors—individual and organizational--may vary as well. Internal influences are defined as the individual characteristics of Midshipmen who attrite from the Naval Academy as compared with those who do not. External or organizational influences include the effect of things such as curriculum, extracurricular participation or leader characteristics. The intention is to determine if there are common characteristics among those who attrite from the Academy and to determine what role organizational factors and Academy experiences have on attrition. If common characteristics can be identified, it may be possible to identify high risk Midshipmen and reduce attrition from the

Academy. If institutional factors play a significant role in the attrition process, training or counseling may be instituted to assist in mitigating their adverse effects.

C. EXPECTED BENEFITS

The results of this study will establish a checklist of characteristics that may indicate a student's propensity to attrite from the Academy. It will also offer evidence as to the relevance of external factors affecting attrition. This knowledge will give the Naval Academy greater insight into why students attrite and, potentially, the ability to intervene to reduce attrition.

D. SCOPE AND METHODOLOGY

1. Scope

This thesis includes: (1) A targeted literature review that examines factors affecting civilian university, corporate, and enlisted attrition and potentially relevant to Academy attrition. (2) An exploratory, broad-scope analysis of the USNA attrition data and the internal and external factors listed above. Specifically, the analysis attempts to determine which factors have a negative or positive impact on retention.

2. Research Questions

a. Primary Research Question

Are there common characteristics of the students who attrite from the Naval Academy?

b. Secondary Research Questions

- What are the major types of attrition afflicting the Naval Academy? Do predictors vary by type of attrition?
- What are the relevant internal and external factors affecting attrition at the Naval Academy?

3. Methodology

Data for this project were obtained from The Office of Institutional Research, Planning, and Assessment (IR) at the Naval Academy. Attrition rates and trends for six USNA cohorts at one year intervals are examined. Specifically, data on graduating cohorts of classes 2000, 2001, 2002, 2003, 2004, and 2005 were obtained. The two main dependent variables are (1) voluntary dropout and (2) involuntary dropout. Thus, a logistic regression analysis was used to determine if the following factors are significant

predictors. The internal influences examined included GPA, major, gender, race, family background, personality indicators, legacy and physical fitness. The external influences were participation in varsity athletics and company assignment. Further, intermediate outcomes such as the number of honor and conduct violations a student has accumulated were examined as mediators.

E. ORGANIZATION OF STUDY

The remainder of this study is divided into four chapters. Chapter II provides background and a literature review of topics related to attrition. It discusses the mission and strategic plan as well as the admissions procedures of the United States Naval Academy. It explores attrition as a construct. Attrition in different environments is described as it relates to high school, civilian post secondary education and service academies. Finally, the variables in the study and the multivariate logistic regression used to analyze the variables are described. Chapter III describes the data and research methodology. Including a detailed description of the steps used to conduct this study. Chapter IV discusses the results of the logistic regression. Recommendations for further research are discussed in Chapter V.

II. BACKGROUND AND LITERATURE REVIEW

A. INTRODUCTION

Before exploring attrition at the United States Naval Academy some background is in order to fully understand the unique nature of the institution and how it varies from a civilian university. The Academy has the important mission of developing future leaders of the naval service. This development includes both their undergraduate education and military leadership development. The education portion of the Midshipmen's experience, regardless of major, has a strong science and math foundation. The Navy has always valued technical courses, probably because of the inherent complexity involved in the efficient and effective employment of ships, submarines, and aircraft. Additionally, the Academy must develop leadership in its students. This is accomplished through their organization as the Brigade of Midshipmen which makes them part of a chain of command. All students also participate in required leadership classes. A brief explanation of the Academy's mission, admissions process, and the different factors affecting Midshipmen as they participate in the Brigade is provided below.

B. THE MISSION OF THE UNITED STATES NAVAL ACADEMY

The mission of the Academy, as stated on their website, is to:

> Develop midshipmen morally, mentally and physically and to imbue them with the highest ideals of duty, honor and loyalty in order to provide graduates who are dedicated to a career of naval service and have potential for future development in mind and character to assume the highest responsibilities of command, citizenship and government. (http://www.usna.edu/Admissions/aboutusna.htm)

This three part mission may impact attrition because it subjects the Midshipmen to three tough objectives. The Midshipmen must perform well morally, mentally and physically in order to graduate. For some this may be a daunting task when one considers civilian undergraduate students must contend with only the mental, or academic, portion in their academic endeavors.

C. U.S. NAVAL ACADEMY ADMISSIONS

The Naval Academy is a special institution that draws high performing individuals. For example, 11,259 students applied to be part of the class of 2009, of those that applied, only 1,220 were admitted (USNA 2006). These individuals must meet minimum requirements to compete for an appointment. Once they meet the requirements to compete for an appointment they must obtain a nomination from an official source such as a Congressman, Senator, the Vice President, or the President. Once a competitive student has an official nomination, his/her application is considered by the Academy's admissions department. This department will assign each applicant a "whole person" multiple (WPM) (USNA 2006). The WPM is a composite score based on the applicant's SAT scores, high school grades, and extra curricular activities. The WPM is a score that enables the admissions department to rank each applicant and assists in determining those who will receive appointments to the Academy. Each year the admissions office finds approximately 2,000 candidates fully qualified. Of those candidates 1,500 receive appointments and 1,200 become Midshipmen. Those Midshipmen that successfully complete four years of instruction and accept a commission as an officer in the Navy or Marine Corps must serve a minimum of five years on active duty following graduation. Those who do not fulfill these requirements must serve in an appropriate enlisted grade on active duty for up to four years or reimburse the United States for the cost of their education (USNA 2006).

D. TYPES OF ATTRITION

1. Introduction

Attrition is a complicated construct. When applied in an educational setting, the most commonly used term is "dropout." A dropout is defined as someone who prematurely disengages and terminates one's education (Alexander, Entwisle, & Kabbani, 2001.) For the purposes of this study, anyone who is admitted to the Academy and departs prior to graduating has dropped out or attrited from the Academy. Even with the extra responsibilities the Midshipmen carry while students at the Academy, they fare well. Between the years of 2000 to 2005, the dropout rate at the Academy was 20% (USNA, 2003-4). This was substantially lower than that of civilian institutions which had a dropout rate of 26.7% in 1997 (http://www.act.org/news/releases/1998/04-01-

98.html) as reported by ACT Inc. Here, civilians failed to graduate from their four year programs. Some went on to graduate later and some failed to return to school at all. The differences in attrition may be attributable in part to the differences in characteristics of students between the Academy and the average university.

The next portion of the study examines attrition as it relates to different areas educational stages. Specifically, it examines high school, post secondary and service academy attrition. It concludes with different factors affecting students regardless of educational context. These factors are then used as independent variables as described in the methods and analysis section of this study.

2. High School Attrition

Attrition is an important topic because it affects both the individual and the country as a whole. Because of mandatory school attendance until the age of 16, the attrition phenomenon is first noted at the high school stage. High school attrition can have profound implications, including an impact on our country's gross domestic product (GDP). High school dropouts earn less than college students. It is estimated that dropouts cost the United States $158 billion in lost earnings and $36 billion in lost state and federal taxes for each class of 18 year olds. This amounts to a total loss of about 1.6% of the country's GDP annually. Dropouts also have shorter life expectancy, roughly 9.2 years less than a high school graduate and therefore, account for a greater portion of subsidized health care costs (Richard, 2005). Of course dropouts' suppression of GDP assumes that higher salaried jobs would be available if there were more graduates. And, the relationship between high school graduation and health is correlational in nature; just graduating would not necessarily make such persons healthier. Regardless of these logical flaws, these associations point out that high school graduation is important to understand.

Smith (2004-2005) found several factors that may identify an at risk student such as being from a single parent family, poor junior high grades, parents without a diploma, and a sibling who dropped out high school. Among the factors he associated with dropping out of school were poor academic performance and being held back a grade prior to high school. Griffen (2002) expounded on poor academic performance in an effort to explain why a student who does not do well academically will tend to dropout.

He found that students who do poorly academically tend to distance themselves from the academic environment, he called this phenomenon "academic disidentification." "Academic disidentification occurs when students attempt to devalue the perceived importance of academic performance in an effort to protect their perceptions of self" (Griffin, 2002, p. 72). Academic disidentification becomes a self-esteem protection tool that may begin a vicious circle toward dropping out.

3. College Attrition

Once a student makes it through high school graduation, he or she is faced with a new set of challenges in completing college. Of those who attend college, 40% graduate within four years and 20% graduate at a later date. Of those who dropout, 50% do so by the end of their first year (Hackman & Dysinger, 1970).

One factor that significantly affects college freshmen is their commitment to education. The students must have a desire to graduate from college. Hackman and Dysinger found that students who were academically competent, committed and persistent had a greater propensity to graduate from college. Additionally, they found those with supportive parents or those that had the attitude of "it [college graduation] had always been expected" (Hackman & Dysinger, 1970, p. 320), were more likely to graduate. Smith examined attrition using both academic and non-academic factors. He found that high school GPA and SAT scores are a good predictor of fifth semester college GPAs (2004-2005). This seems to confirm Hackman and Dysinger's findings that students with academic aptitude were less likely to dropout of school. Smith also found that non-academic factors such as involvement in college programs and activities outside of classes contributed positively to retention among new college students (Smith, 2004-2005).

4. Service Academy Attrition

Factors affecting Service Academy attrition may be different than those at work within civilian colleges. There are programs in place that enable new students to rapidly orient and acclimatize to the military life. Plebe summer is an in-depth orientation designed to acclimatize new Midshipmen to life at the Academy. The objectives of Plebe summer as stated by the Naval Academy's web site are to teach Plebes how to wear their uniform and keep their rooms "squared away", to know their jobs and duties, and how to

follow, to pass the Plebe Summer physical readiness test (PRT), and to understand how to stay in shape, to appreciate the difficulty of academics and level of studying required and understand the academic year routine of the Brigade (http://intranet.usna.edu/PlebeSummer/PS%20'05%20Mission%20&%20Objectives.doc). Midshipmen who attend the Academy have been vetted by a particularly rigorous screening process. They are all top performers, their average SAT Math score is 672. So, they likely have what Hackman and Dysinger's described as academic aptitude.

5. Factors Affecting Attrition

a. College Grade Point Average

Several studies have focused on characteristics of students as they relate to their propensity to drop out of school. Magnum, Baugher, Winch, and Varanelli (2005) found that first semester GPA was one of the top three indicators of dropping out among students in civilian colleges. Scholastic aptitude is important to the students at the Naval Academy. Midshipmen must maintain a 2.0 average to graduate. Therefore, Academic Quality Point Ratio (AQPR) may be an indicator of attrition. Additionally, average AQPR may vary depending on the students' major. Midshipmen are required to take classes that give them a strong background in math and science. Therefore, students who are history or political science majors at the Academy may have more technical classes than their civilian counterparts.

b. Physical Fitness

Midshipmen must maintain physical fitness standards while at the Naval Academy to graduate. Those who have a difficult time maintaining the standard may have a higher probability of dropping out of the Academy.

c. Gender and race

Personal and social development play significant roles in an individual's college experience. According to McGaha and Fitzpatrick (2005), the underlying premise is that personal (loneliness, interpersonal competence) and social (marginality) factors might color the students' experiences and perhaps affect their risk propensity. Women and minorities will be most affected by these factors because of their smaller numbers in the Brigade of Midshipmen. Loneliness is defined as the subjective dissatisfaction of unmet needs in the context of personal relationships (Leung, 2002; Neto

& Barros, 2000). Women may be some of the loneliest students at the Academy. Between the years of 2000 to 2005, they constituted an average of 16.5% of the Brigade (USNA, 2003-4). Miller and deWinstanley(2002) reported that competent undergraduates had greater recall of problem-solving conversations with same-sex peers. This indicates students prefer to participate in and do better with a support structure consisting of the same sex. Therefore, women may be at greater risk of attrition because of their smaller numbers. Social factors also affect minorities. In the same years listed above for women, minorities accounted for an average of 17.9% of the Brigade (USNA, 2003-4). Like women, their small numbers make them more susceptible to personal and social isolation factors. According to McGaha and Fitzpatrick (2005) minorities' experience is often the same: marginalized students perceive their college community is not invested in them and they become less invested in the college experience. Rankin and Reason (2005) also found that students of color experienced harassment, defined as any offensive, hostile, or intimidating behavior that interferes with learning, at higher rates than White students, although White female students reported higher incidence of gender harassment (2005). Further, some students fall into a category called "double jeopardy." This category includes a minority who is also a woman. Nearly half the students in this category report having experienced racism or sexism (Landry, 2003). Thus, personal, social, and marginalization factors might be positively related to risk. Therefore, gender and ethnic background should be considered as factors that may affect attrition at the Academy.

d. Varsity Athletics

Varsity athletics is another area that may shed some light on a student's propensity to drop out. In his thesis, Harvey (2003) failed to find statistical significance between performance at the Academy and participation in varsity athletics. However, varsity athletics may have an impact on retention. The college years are a time when students develop and practice their interpersonal relations, leadership skills, and general personal development (Pascarella & Terenzini, 2005). Varsity athletics may assist a student in the development of these skills and should be considered when examining attrition.

e. Honor and Conduct Violations

Personal and social developments are implicated in honor and conduct violations as well. Low, Williamson, and Cottingham (2004) studied indicators and predictors of student law breaking behaviors. Although conduct and honor violations are not necessarily law breaking activities in the strictest sense, their predictors may help us identify those who are going to violate Midshipman regulations. Many university students are still exploring alternative life goals as part of their identity development (Erickson, 1968; Marcia, 1993; Waterman, 1985). Many became involved in activities as a means to impress peers to fit into their new social crowd (Low, et. al, 2004). Therefore, those who have a greater number of honor and conduct violations may have a more difficult time adjusting to Academy life and an increased risk of dropping out.

f. Company Assignment

The Brigade of Midshipmen is composed of approximately 4000 students. The Brigade is broken into two Regiments, each composed of three Battalions. Each Battalion is composed of five Companies. Each company is composed of about 160 Midshipmen, approximately 40 students from each class, freshman, sophomore, etc. The company becomes the student's home or core group of friends. They are assigned to a company following plebe summer and stay with that company until they graduate. Each company has an active duty officer assigned to supervise its functioning; this officer is called the company officer. This officer is experienced in the operational side of the Navy and Marine Corps. Their experience and graduate education give them knowledge and credibility to act as advisors to the members of their company.

Each company likely has a unique culture and will affect how a new student assimilates into the Academy environment. The company is the primary social environment for the student. For many it provides a social balance or coping mechanism. Pizzolato's (2004) research indicated that students found social relationships to be beneficial to their coping strategy and instrumental in reaching emotional clarity and finding solutions to challenging situations. A key aspect of company assignment as a variable in this study is the degree to which the company officer fills the role of mentor to their people. "Mentoring is a process through which persons of higher status, special achievements and prestige, instruct, counsel, guide and facilitate the intellectual and

career development of program participants" (Santos & Reigadas, 2004-2005, p. 339). Students with a better balance and coping mechanisms should be less likely to drop out of the Academy. Supportive company culture and leadership may have a significant impact on whether the students stay.

E. SUMMARY

In the realm of higher education, the United States Naval Academy is a unique institution. It maintains the three part mission of preparing students mentally, morally, and physically for duty in the Naval Services. The mental portion of the mission is particularly rigorous. All students, regardless of major, take a heavy load of technical classes. In addition to the unusually high technical load they are members of the Brigade of Midshipmen. These duties subject them to additional regulations that do not apply to their civilian counterparts. Participation in the Brigade and this additional set of regulations maintain the Academy's ability to develop the Midshipmen morally. To accomplish the third part of its mission, the Academy requires all students participate in athletics and are subject to the Navy's semi-annual physical readiness test. This unique requirement provides yet another layer of supervision the civilian student lacks. It also becomes another stress to the Midshipmen as they strive to complete a rigorous educational program.

Attrition is a complicated construct. It has implications for the individual, the institution and society as a whole. For the individual, there are many factors that may affect propensity to drop out. These factors vary between individuals, ethnic groups, and gender, etc. The institution, whether civilian or military, has a vested interest in attrition for a variety of reasons. Fiscally, the institutions are interested because every student that drops out represents lost opportunity for another applicant and the sunk cost of resources in recruiting and educating that student. There is also a measure of institutional pride and reputation in an institution's ability to attract, educate, and provide society with educated and productive young people. Society should be concerned with attrition because of its implications on national productivity. One of the key measures of a country is the level of education of its citizens. Education can be an indicator of a country's GDP and social status. Therefore, higher levels of education reflect positively on the country's reputation.

The focus of this study is to examine factors that may affect attrition at the United States Naval Academy. If factors that have significant impact on attrition can be identified a system of intervention and coaching may be developed to reduce at risk students.

THIS PAGE INTENTIONALLY LEFT BLANK

III. DESCRIPTION OF DATA AND RESEARCH METHODOLOGY

A. INTRODUCTION

This chapter describes the data used in this study and the analyses conducted. The purpose of this research is to examine and describe attrition and analyze factors affecting attrition at the Naval Academy. The intention is to determine if there are common characteristics among those who attrite from the Academy and to determine what role organizational factors and academy experiences have on attrition. If common characteristics can be identified, it may be possible to identify high risk Midshipmen and reduce attrition from the Academy. The desired outcome for this study is a list of factors the Company Officer can use to identify those students with a propensity to attrite from school and intervene when appropriate. Attrition following sophomore, Second Class, year is of particular interest. After students have completed the second year of school they have committed themselves to active duty service. Any attrition following this year is particularly costly for two reasons. First, dropouts must repay the government for the cost of their education out of pocket or through service in the enlisted ranks. Second, the Academy has lost the opportunity for another well-suited applicant to attend the institution. Therefore, any reduction in attrition, particularly late term attrition, increases the fiscal efficiency of the institution and provides more qualified officers to the fleet.

B. RESEARCH APPROACH

First, trends in attrition were examined for each of the graduation classes that comprised the sample for this study. The classes were compared to one another and, when appropriate, grouped for comparison. The classes were examined to identify trends or abnormalities in their attrition rates. Next, simple relationships between attrition and the factors identified by the literature review were conducted. If significant, the variable was retained for a multivariate analysis. Finally, logistic regression was used to examine factors that related to individuals that dropped out of the Academy. That is, through logistic regression, factors that were significantly linked to attrition were identified and

their relative contribution was assessed. A hierarchical strategy was employed with demographics entered into the regression equation first, followed by other background factors and then Academy experiences.

C. DESCRIPTION OF DATA

Data were obtained from the United States Naval Academy's Institutional Research department. The data, resident in their data warehouse, covered any student that attended the Academy under six graduating cohorts (2000, 2001, 2002, 2003, 2004, and 2005). There were 6,906 cases in the initial data set. Of those cases one did not have a valid status code. This case was removed from the data. The number of valid cases following data cleaning was 6,905 cases. Table 1 provides a list of variables that were modified for analysis and their description.

Table 1: Data Coding for Variables Included in the Attrition Analyses

Original Variable	New Variable	Value
status_c	Attrite	1 = Attrite 0 = Non-Attrite
gender_c	Gender	1 = Female 0 = Male
feeder_c	Accession Source	1 = Other than high school 0 = High school
prior	Prior_Enl	1 = Prior experience 0 = No prior experience
ethnic_c	Minority	1 = Minority 0 = White
major_grp	Major	1 = Group 1 Major 2 = Group 2 Major 3 = Group 3 Major 0 = Undeclared
varsity	Varsity1	1 = Varsity athlete 0 = Non-varsity athlete
attcd	WhyLeft	100 = Graduated 10 = Attrite – medical 1 = Attrite – voluntary 0 = Attrite – non-voluntary

D. METHODOLOGY

The research was conducted in three stages. The first stage was an overall examination of attrition among the year groups. The groups were compared to see how attrition varied by year and if any attribute stuck out as a possible reason for the variance

in attrition. Chi-square tests were used to determine if the classes were statistically similar. When appropriate, class cohorts were grouped for analysis. The second stage of the analysis looked to the data set as a whole to determine which variables should be included in the final analysis of the attrition model. Chi-square tests were used to determine if an attribute had a significant affect on attrition. The tests were run independently with each potential independent variable and the binomial variable of "attrite". If the attribute was significant it was retained for use in stage three of the research. The third and final phase of research was using logistic regression to determine the level of influence each attribute had on attrition.

THIS PAGE INTENTIONALLY LEFT BLANK

IV. RESULTS

A. INTRODUCTION

The research was accomplished in three stages. Stage 1 was an exploratory analysis of the data set. Class cohorts were compared to determine if they were similar, and attrition within the cohorts was examined to see if there were any identifiable trends. Frequencies for several variables were compared via chi-square analyses to get a macro view of attrition in the individual class cohorts. Stage 2 examined different variables that may affect attrition in the data set as a whole. Chi-square tests were used to determine if a variable had a significant impact on attrition. Since class cohorts were not statistically different they were combined for subsequent analyses. The larger data set allowed for a greater number of cases (n = 6905) thus, greater predictive accuracy. In Stage 3 the variables determined to be statistically significant were used in a logistic regression to determine their overall affect on attrition. Output from the logistic regression was used to help in identifying which variables had the greatest impact on attrition and the degree to which they affected attrition. A Hierarchical strategy was used to evaluate the groups of variables and isolate those that the Company Officer had no control over.

B. STAGE 1: COHORT ANALYSES

The purpose of this stage was to explore the data set. There were five class cohorts in the data set: 2000, 2001, 2002, 2003, and 2005. The first variable analyzed was "Gradyr_Recode". Frequencies and Chi-Square tests were run to compare each graduating cohort with their populations and to determine if their attrition numbers were statistically similar. With the exception of the class of 2005, the cohorts were relatively stable in terms of size and attrition rate. Cohort 2005 was larger and had a substantially higher attrition rate as shown in Table 2.

Table 2: Distribution and Attrition for Midshipmen from Graduation Year Cohorts 2000-2005

Graduation Year Cohort	Frequency	Percent	Percent Attrition	Chi Square for 2000-2004
2000	1117	16.2	15.2	
2001	1084	15.7	14.9	
2002	1155	16.7	15.4	.94 ns
2003	1152	16.7	14.2	
2004	1167	16.9	14.4	
2005	1230	17.8	20.7	
	6905	100.0	$X^2 = 27.4$ ***	

* = p < .05; ** = p < .01; *** = p< .001; n.s. = non-significant

Whereas a comparison across the full set of graduation years showed significant differences ($x^2 = 27.4$; $p < .05$), when the class of 2005 was removed from the analysis attrition rates for 2000-2004 were statistically similar (X2 = .94; $p > .05$) Cohort 2005 was anomalous. Cross-tabulations and frequencies were used to assess whether differences in characteristics were related to the higher attrition rate for that year group as compared to the four statistically similar groups. Table 3 summarizes the differences between the average of the 2000-2004 cohorts and the 2005 cohort. The 2005 cohort was numerically larger and the data suggest that it was less selective.

Table 3: Comparison of Characteristics for Cohort 2005 and the Average of Cohorts 2000-2004

Variable	2000-2004	2005	Difference	Cohort 2000 - 2004 Significance	Cohort 2005 Significance
Minority	18.6	21.5	2.9	X^2 = 34.5 ***	X^2 = 8.5 **
Female	16	15.8	-0.2	X^2 = 123.2 ***	X^2 = 1.2 n.s
Prior Service	7.3	8.9	1.6	X^2 = 5.4 *	X^2 = 2.5 n.s
Access non-hs	23.5	23.9		X^2 = 10.1 **	X^2 = 5.4 *
Major Group Level				X^2 = 1602.0 ***	X^2 = 317.2 ***
1. Engineering	31.8	29.7	-2.1		
2. Math & Science	23.4	24.6	1.2		
3. Humanities	40.2	39.5	-0.7		
				X^2 = 10.5 ***	X^2 = 6.7 *
Varsity Athletes	49.1	46.4	-2.7		
				X^2 = 8.7 *	X^2 = 3.3 n.s.
Conduct Violations, 1 or more	28.2	32.1	3.9		
				X^2 = 341.9 ***	X^2 = 33.5 ***
Failed PRT (1 or more)	22.8	25.2	2.4		
				t = -34.5 ***	t = -17.7 ***
Academic GPA (Mean)	2.89	2.9	0.01		

* = p < .05; ** = p < .01; *** = p< .001; n.s. = non-significant

The characteristics that were found to be significant for the two groups were major group level, failed physical readiness tests, and academic GPA. The characteristics that showed divergent findings for the two groups were gender, prior service, and conduct violations. Each of these variables was significant for the earlier cohorts but not significant for the 2005 cohort. The larger number of cases in the earlier cohorts suggest that they are related to attrition overall.

The reason for leaving the Academy was examined next. Frequencies of the variable "WhyLeft" were examined by cohort to determine if there were any anomalies. This variable separated the cases into four categories where the student: graduated, left due to medical reasons, left voluntarily, or left non-voluntarily. The results for the 2005 cohort and the combined 2000-2004 cohorts are in Table 4.

Table 4: Reason for Attrition by Cohort

	Cohort 2000 - 2004	Cohort 2005
Attrite - non-voluntary	5.4%	6.9%
Attrite - voluntary	9%	13.7%
Attrite - medical	0.4%	0.2%
Graduated	85.2%	79.3%

The class of 2005 had higher rates in all types of attrition as compared to previous cohorts. The largest difference was 4.7% in voluntary attrition.

Timing of the attrition was examined as well. Table 5 shows number of students that dropped out during each class year and the reason for their departure for the entire data set. In these tables freshmen, sophomores, juniors, and seniors are 4/C, 3/C, 2/C, and 1/C respectively. The students listed as 0/C are late graduates. They make up a small portion of the data set and all eventually graduated. As expected, attrition frequency was highest in the first two years.

Table 5: Class Year and Reason for Leaving Cross-Tabulation

		ReasonForLeaving				Total
		attrite - non-voluntary	attrite - voluntary	Attrite - medical	Graduated	
Last Class at USNA	0/C	0	0	0	55	55
	1/C	78	15	3	5754	5850
	2/C	81	47	11	0	139
	3/C	123	272	4	0	399
	4/C	111	342	8	0	461
Total		393	676	26	5809	6904

The majority of the students left during their 3rd or 4th class year. Table 6 displays the year in school and attrition percentages for the two groups. The class of 2005 had an unusual increase (0.49%) in non-voluntary attrition during the second class year. They also had a lower graduation rate (5.75%) than the previous cohorts.

Table 6: Class Year and Reason for Leaving Percentages

	Cohort 2000-2004 N = 5675					Cohort 2005 N = 1230				
	0/C	1/C	2/C	3/C	4/C	0/C	1/C	2/C	3/C	4/C
Attrite - non-voluntary	0.00	1.06	0.95	1.80	1.62	0.00	1.46	2.20	1.71	1.54
Attrite - voluntary	0.00	0.21	0.65	3.65	4.44	0.00	0.24	0.81	5.28	7.32
Attrite - medical	0.00	0.05	0.16	0.07	0.14	0.00	0.00	0.16	0.00	0.00
Graduated	0.83	84.37	0.00	0.00	0.00	0.65	78.62	0.00	0.00	0.00

The tables above indicate when and for what reasons the students left the Academy. Percentages provide a comparative measure of how the students left among year groups. The class of 2005 had a higher percentage of students who were dismissed and who left voluntarily.

C. STAGE 2: DATA SET ANALYSIS

This stage of analysis examined the data set as a whole. Attrition as a whole was examined first. Of the 6,905 cases in the set, 1,096 (15.9%) dropped out of the Academy, Table 7.

Table 7: Attrition Frequencies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	5809	84.1	84.1	84.1
	1	1096	15.9	15.9	100.0
	Total	6905	100.0	100.0	

Next, the variables thought to impact attrition were examined for the entire data set. They were analyzed as to their frequency and their significance when compared to those who attrited from the Academy. The results for these variables are in Table 8.

Table 8: Independent Variable Frequency, Percentage, and Significance

Variable	Frequency in Data Set	Percentage in Data Set	Frequency to Attrite	Percentage to Attrite	Significance
Minority					X^2 = 44.8 ***
Caucasian	5582	80.8%	806	14.4%	
Non-Caucasian	1323	19.2%	290	21.9%	
Gender					X^2 = 22.6 ***
Male	5802	84.0%	868	15.0%	
Female	1103	16.0%	228	20.7%	
Prior Service					X^2 = 8.5 **
Non-Prior Enlisted	6379	92.4%	989	15.5%	
Prior Enlisted	526	7.6%	107	20.3%	
Accession Source					X^2 = 15.2 ***
High School	5275	76.4%	787	14.9%	
Non-High School	1630	23.6%	309	19.0%	
Major Group Level					X^2 = 1915.7 ***
0. Undeclared	339	4.9%	339	100.0%	
1. Engineering	2170	31.4%	179	8.2%	
2. Math & Science	1628	23.6%	211	13.0%	
3. Humanities	2768	40.1%	367	13.3%	
Athletic Status					X^2 = 17.4 ***
Non-Varsity	3545	51.3%	626	17.7%	
Varsity	3360	48.7%	470	14.0%	

Conduct Violations					X^2 = 13.2 ***
No Violations	4908	71.1%	729	14.9%	
One or More	1997	28.9%	367	18.4%	
Failed PRT					X^2 = 364.5 ***
No Failures	5303	76.8%	597	11.3%	
One or More	1602	23.2%	499	31.1%	
Academic GPA		mean = 2.282			t = 30.470 ***

* = p < .05; ** = p < .01; *** = p< .001; n.s. = non-significant

Table 8 indicates all variables were significantly related to attrition. Interestingly, those that failed one or more physical readiness tests had a fairly high rate of attrition. As supported by the literature, minorities and females also had higher rates of attrition. All the variables tested in stage 2 were found to be statistically significant therefore; all were included in the stage 3 analysis.

D. STAGE 3: LOGISTIC REGRESSION

Hierarchical binary logistic regression was run to determine the multivariate effect of the independent variables on attrition. The variables were divided into three groups for the regression. The first group was demographics; this group included any variable that identified a demographic feature of a student. The variables included in the demographic group were "Minority" and "Gender". The second group of variables was background factors. Background factors included any variable that identified a student's pre-Academy experiences. The variables included in this group were "Accession_Source" and "Prior_Enl". The third and final group of variables was Academy experience. Academy experience included the remaining five variables and focused on the individual's experience while a student at the Academy. The variables included in this group were major group level, varsity athlete, one or more conduct violations, one or more failed physical readiness tests, and academic GPA. These groups were analyzed in this order to provide greater emphasis on the Academy experience variables. These variables were thought to be characteristics that would provide the greatest signals of attrition and ones that the Company Officer would have the most influence over. They were analyzed using hierarchical logistic regressions to control for the demographics and background factors. The results of these regressions are in Table

9. All three regressions were found to be statistically significant. Interestingly, the full regression that included Academy experiences resulted in a less efficient model (-2 Log likelihood = 3885.788) but explained a greater portion of the variation (Cox & Snell R2 = .194).

Table 9: Hierarchical Regression Table

Variable	Demographics Exp(B)	Background Factors Exp(B)	Academy Experiences Exp(B)
Constant	.158 ***	.149 ***	212.884 ***
Minority	1.649 ***	1.595 ***	1.036
Female	1.462 ***	1.506 ***	1.733 ***
Access non-hs		1.162	0.685 ***
Prior Service		1.313 **	1.719 **
Major Group Level			.997 **
Varsity Athlete			.845 *
Conduct Violations, 1 or more			1.285 **
Failed PRT (1 or more)			2.318 ***
Academic GPA (Mean)			.062 ***
-2 Log likelihood	5980.824	5967.823	3885.788
Chi-Square	61.749	74.749	1451.618
Cox & Snell R Square	0.009	0.011	0.194

* = p < .05; ** = p < .01; *** = p< .001; n.s. = non-significant

Table 10 displays the variables included in the regression and their associated scores. The results for this regression indicate that if a student is a minority, female, prior enlisted, has one or more conduct violations, or has failed one or more physical readiness tests, the student is more likely to attrite from the Academy. Conversely, a student that accesses from other than high school, plays varsity athletics, and has a higher academic GPA is less likely to attrite. To summarize, in this model the variables with the largest probability of increasing attrition are physical readiness test failures and being female. The variables with the largest probability of decreasing attrition are a high GPA and coming to the Academy from other than high school.

Table 10: Variable Results for the Full Model (All Variables)

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1(a)	Minority	.035	.098	.128	1	.721	1.036
	Gender	.550	.107	26.618	1	.000	1.733
	Prior_Enl	.542	.156	12.082	1	.001	1.719
	Accession_Source	-.378	.104	13.274	1	.000	.685
	Major	-.003	.001	10.656	1	.001	.997
	Varsity_Ath	-.168	.085	3.954	1	.047	.845
	Any_Violation	.251	.086	8.561	1	.003	1.285
	PRT_Failure	.841	.091	85.395	1	.000	2.318
	caqpr	-2.783	.101	756.094	1	.000	.062
	Constant	5.361	.281	364.656	1	.000	212.884
Regression Summary:	-2 Log likelihood	3885.788	Cox & Snell R Square	.194	Nagelkerke R Square	.354	

* = p < .05; ** = p < .01; *** = p< .001; n.s. = non-significant

The regression was run with all nine variables and the Nagelkerke R Square value indicates that the regression accounted for approximately 35.4% of the variation in the model.

E. SUMMARY

Stage 1 of the analysis provided an overall look at attrition for the graduating years of 2000 – 2005. Results for this stage indicated that Cohorts 2000 -2004 were statistically similar and that cohort 2005 was anomalous. Cross tabulations and frequencies were used in an attempt to determine why cohort 2005 was anomalous. In comparison to the other classes it was noted that 2005 was larger. Additionally, several variables that were significant for the earlier classes did not appear significant for 2005; these variables were gender, prior service, and conduct violations. Finally, a comparison of type of attrition was conducted in order to compare why members of the cohorts left. The class of 2005 had a slightly greater percentage of students who were dismissed (1.5%). However, there was a relatively large increase in the percentage of students that asked to leave (4.7%).

Stage 2 of the analysis examined the nine variables identified in the literature review as relevant to attrition and examined them within the entire data set. Chi-square tests were used to determine if an individual variable was significant to attrition overall.

All nine variables were found to be significant. The variables with the highest rates of attrition were physical readiness test failures, minorities, and women. Those with at least one PRT failure had the highest attrition rate of 31.1%. This was a relatively high when compared to the rates for minorities and women were 21.9% and 20.7%, respectively. All nine of the variables examined were found to be significant, therefore; all nine were included in the logistic regression.

Stage 3 of the analysis was the hierarchical logistic regression. The nine variables were divided into three groups, demographics, background factors, and Academy experiences. They were included in the regression to give greater weight to the variables that represented Academy experiences. The model included all nine variables and accounted for approximately 35.4% of the variability of the dependant variable. Once again the top three variables that contributed to attrition at the Academy were PRT failures, gender, and minority status.

THIS PAGE INTENTIONALLY LEFT BLANK

V. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

A. SUMMARY AND CONCLUSIONS

The research was conducted in three stages. Stage 1 was an exploratory stage that compared the six graduating cohorts. Frequencies and descriptive statistics were used to provide a general description of the cohorts and their attrition rates. Stage 2 was a targeted analysis of variables identified in the literature review. This analysis focused on determining if the variables had a significant impact on attrition for the six graduating cohorts. Stage 3 was a series of logistic regressions. The regressions attempted to identify how much each significant variable from stage 2 influenced a student's propensity to drop out of the Academy. A summary of each stage is described below.

1. Stage 1

This stage examined the similarities and differences of the six graduating cohorts. The analysis started by generating frequencies of graduation rates for each class. Of the entire data set (n = 6905) classes 2000 – 2004 had an average enrollment of 1135. The class of 2005 increased in size by 1.4% (Table 2). Additionally, the class of 2005 experienced a 6.3% greater attrition rate than the previous class. Further analysis indicated the class of 2005 had a 4.8% greater attrition rate than the average of the previous five classes. The class of 2005 was anomalous, it was statistically different from the previous five classes, it was larger, suffered higher than average attrition, and the nine variables affected it differently.

The most recognizable difference in the 2005 cohort is its increase in size. The class is nearly 100 students larger than the average of the previous five classes. There are several reasons more students were admitted to the Academy during this period. First, this would have been the first class to begin attending the Academy since the terrorist attacks on September 11th, 2001. Perhaps current events and the anticipation of an increased role for the military were factors that contributed to the higher class size. Also, a wave of patriotism washed over the country as the students of this class were applying to colleges. More civilian students may have felt the desire to serve their country and applied to the Academy. These two factors may have worked in concert to increase the size of the class. The Navy anticipated needing more people and the students felt a need

to serve. Once at the Academy the students may have become disenfranchised for several reasons. Hackman and Dysinger (1970) discussed commitment as a key factor to college attrition. Students who applied to the academy out of a temporary patriotic fervor may not have been as committed to succeeding in a military institution as someone who planned on attending all along. These students were also subject to social factors that may have set them apart from their peers. For example, a student who applied on a whim had less in common than one who had been working toward a Naval Academy appointment their entire high school career. These students may have felt isolated and lacking in the interpersonal confidence McGaha and Fitzpatric (2005) discussed. Once the experience became too "real" these students would have asked to leave the Academy. This hypothesis seems to be support by the data that indicated the class of 2005 had a higher voluntary attrition rate in the 3rd Class year.

2. Stage 2

When analyzed together, all nine independent variables had a significant effect on attrition. Those that seem to play the greatest role were one or more failed physical readiness tests, minority status, and gender. The physical mission is an important part of the Academy's development of future Naval officers. Physical fitness was a difficult construct to measure because civilian institutions do not generally care what level of physical fitness their students maintain. In a military environment physical condition is important for the future mission as well as maintaining a standard. Those who fail to maintain this standard may have a difficult time establishing interpersonal credibility and leadership. Pascarella and Terenzini (2005) discussed the importance of this development as a student tries to establish him or her self as a part of a social order. Failures in the physical readiness test would be apparent to other students and may adversely affect their ability to become part of the Academy culture. Further, failures in the physical readiness test may also indicate the lack of commitment discussed by Hackman and Dysinger (1970). A student who does not have the self discipline to stay in shape will always have a difficult time in a military atmosphere.

Minorities were also more likely to drop out of the Academy. At the Academy both women and students of other races are minorities. They are in a smaller group and have a statistically higher probability of dropping out. As Leung (2002), Neto and Barros

(2000) discussed, they are more likely to be lonely and lack the ability to draw on a broad spectrum of students of like gender or race. This lack of interpersonal relationships translates into loneliness. A high level of loneliness will eventually turn into dissatisfaction. If that dissatisfaction is great enough the student will eventually drop out. Not all minorities or women are likely to be lonely while at the academy but they will have a more difficult time finding peers of the same race or gender. Miller and deWinstanley (2002) discussed undergraduates who had deeper and more meaningful conversations with those of the same sex. While these students may not experience widespread loneliness or dissatisfaction, they are having a more difficult time fitting in and finding large social circles that fully support their development.

3. Stage 3

The findings in the hierarchical logistic regression were similar to those noted in stage two. Specifically, failed physical readiness tests, minority status, and gender were had the highest percentage of attrition in stage two and were found to be the most significant in the logistic regression. The regression indicated that the three variables with the greatest probability of increasing attrition were, in descending order, one or more failed physical readiness tests, gender, and minority status. The analyses of the gender and minority variables are discussed above. The two remaining variables, accession source and conduct violations, both relate to how a student adjusts to a new environment.

Students that come to the Academy from a prior enlisted background appear to have a higher probability of dropping out. These students come to the environment with preconceived notions and experiences their civilian counterparts do not have. For example, the prior enlisted student has already been through boot camp and completed military indoctrination. The indoctrination for the Academy and its rigid atmosphere are more restrictive than that of "fleet life" for the average prior enlisted sailor or Marine. This will create some incongruence for the prior enlisted student as they try to balance what they know with what they are seeing. Also, few students have prior experience and may have a difficult time finding the social interaction Leung (2002), Neto and Barros (2000) discussed. Finally, the prior enlisted student has tangible options if they drop out. They have the option to return to their enlisted careers in an attempt to continue where

they left off. Therefore, as their dissatisfaction with the academy grows their commitment may drop off more quickly. Hackman and Dysinger (1970) identified commitment as one of the most important aspects of college attrition. If prior enlisted students become dissatisfied to the point their commitment wavers they could be in grave danger of dropping out.

Those students with conduct violations are similar to the other groups in their effort to find a social group and fit in. The students who have conduct violations are still developing and trying to determine their goals. As Erickson (1968) explained, they are, in a sense, exploring their options through trial and error. Unfortunately, some of these trials are against the rules and they are sucked into the Academy's conduct system. Once in the system they may be labeled a trouble maker. At this point they seek others with similar backgrounds and experiences. This group becomes the coping mechanism Pizzolato (2004) described. Entry into this group can be seen as prestigious in a conduct counterculture. Advancement in this counterculture is accomplished by breaking more rules. The cycle builds on itself until the student has enough demerits to be kicked out of the Academy.

Varsity athletics, high academic GPA, and accession source were identified by the model as likely to decrease the probability of attrition. Varsity athletes at the Academy are particularly busy. They have the responsibility of living up to the three part mission of the Academy as well as the extra requirements of practicing and participating in a time consuming, nationally renowned, athletic program. One would assume this strenuous schedule would contribute to higher attrition rates however, the opposite is true. Participation in varsity athletics continued to be a variable that helped reduce the rate of attrition at the Academy. There are three potential reasons for this phenomenon. First, the athletes have a robust social network. The varsity programs give each student-athlete an additional group identity with peers who share the same lot in life. This social atmosphere enhances their feeling of belonging and reduces loneliness. Thus, they do not have the issues of those discussed above. Second, the athletes receive extra tutoring on the road. Every time a varsity team travels, tutors accompany the team to make the "academic most" out of the time away from school. The increased access to tutors may be an important step in keeping marginal students on the high side of the 2.0 GPA

requirements. Finally, the Academy gains much notoriety from its athletic programs. As the Academy dominates in different sports, more money is generated by both the alumni association and other donors who support the programs. Therefore, it is beneficial to the institution to retain its top performing athletes. Two ways to accomplish this are to put them in easier curriculum and subject them to a lower academic standard. The majority of varsity athletes are in group 3 majors, arguably the easiest of the majors offered at the Academy. If they are not held to the same GPA standards as the rest of the Brigade it would be more difficult to dismiss them. Therefore, this could also be the reason participation in varsity athletics as an increased probability of reducing attrition.

B. RECOMMENDATIONS FOR FURTHER RESEARCH

This analysis did not explore why the class of 2005 grew as compared to previous classes or showed an increase in nearly all types of attrition. Future research should compare the class of 2005 to more current classes to determine if the trend continues. If it continues, additional models should be developed in an effort to more accurately predict attrition.

This study did not evaluate admissions standards to the Naval Academy. There appears to be an upward trend in admission numbers potentially due to the current Global War on Terror and the increased operational tempo for the operating forces. The increase in admissions as well as the increase in attrition may be attributable to a decrease in admissions standards in order to fill its increased operational quotas. Future research should attempt to identify how the admissions standards may have changed due to current events.

The independent variables discussed in this research were binomial, which did not allow for detailed analysis. For example, this study identified varsity athletes but did not focus on the type of sport being played. There may be some correlation between attrition and a particular sport. Future research could attempt to identify attrition rates between sports to identify differences. This research has shown varsity athletics seems to make attrition less probable. If a single sport is a significant contributor to this affect their procedures may be beneficial to other sports and the Brigade as a whole. Conduct violations also fit this theme. They were not broken down by violation and there may be

some significance between the different violations and attrition. Future research could separate the violations in order to determine if any one violation is more significant than another.

Finally, qualitative research that focuses on minorities, women, athletes, and those with poor physical readiness scores could provide valuable insight into interpersonal issues within each group. These insights may provide an increased awareness and effectiveness for those who act in a counselor's role, like Company Officers.

C. RECOMMENDATIONS TO THE U.S. NAVAL ACADEMY

The physical mission at the academy is an important one. This research demonstrates it may be more important than previously thought. The current physical readiness test has passed the test of time and is currently being used in the operating forces. The Academy should look to its enforcement standards specifically, to the punishment for failing one of these tests and the remediation program. Increased attention to those who might struggle with the physical test may help prevent them from failing one and eventually attriting.

The Naval Academy already takes great pains to bring people from both genders and all walks of life together to form a highly effective team. This research has shown the importance of continuing these actions. Further, the Academy should continue to support any extra curricular activity that provides minorities and women a chance to interact as a homogenous group. These activities will foster a sense of social belonging that will carry over into their academic, professional and social lives. This sense of belonging will decrease their loneliness and, ultimately, reduce attrition.

Finally, the Academy should focus increased effort on proactive counseling of Midshipmen. The Company Officer is the first line of defense because they have the most frequent interaction with the students. Therefore, Company Officers should receive increased training in formal counseling while participating in the LEAD program.

APPENDIX: VARIABLES IN THE DATA SET FOR ANALYSIS

Table 11. Variables In Data Set

Variable	**Description**	**Value**
Mid_id	Midshipman Identification number	Unique number identifying each Midshipman
Status_c	String, Status Code	30 = Attrite 40 = Graduate 41 = Late Graduate
Attrite (recoded from Status_c)	Categorical: Attrite, Graduate, Late Graduate	1 = Attrite 0 = Graduate
Grad_yr	String, Graduating year cohort	Graduation year 2000, 2001, 2002, 2003, 2004, 2005
Gradyr_Recode (recoded from Grad_yr)	Numeric recode to allow analysis	$X_1X_2X_3X_4X_5$ 2000 = 00000 2001 = 00001 2002 = 00010 2003 = 00100 2004 = 01000 2005 = 10000
LastClass	Rank upon departure from USNA	4/C, 3/C, 2/C, 1/C
Attcd	Attrition Code	1 = voluntary resignation plebe summer-motivation 3 = voluntary resignation plebe summer-personal 4 = voluntary resignation plebe summer-other 11 = voluntary resignation ac year-motivation 12 = voluntary resignation ac year-academic 13 = voluntary resignation ac year-personal 14 = voluntary resignation ac year-other 21 = qualified resignation-conduct 22 = qualified resignation-honor 23 = qualified resignation-honor and conduct

		24 = qualified resignation-aptitude 25 = qualified resignation-conduct and aptitude 41 = academic discharge-academic 42 = academic discharge-academic and aptitude 44 = academic discharge-academic, aptitude, and conduct 51 = discharged-aptitude 52 = discharged-aptitude and conduct 53 = discharged-conduct 54 = discharged-honor 60 = medical discharge 63 = deceased-accidental 66 = deceased-medical
Company	Company assignment	Company number 1-30
Caqpr	Academic QPR	0.00 – 4.00
Cmqpr	Military QPR	0.00 – 4.00
Ethnic_c	Ethnic code	AF = African-American AS = Asian-American CA = Caucasian FI = Asian-American HI = Hispanic NA = Native American OT = Other
Feeder_c	Feeder code	B = BOOST F = Foundation K = NPS N = NAPS X = Direct/HighSchool
Gender_c	Gender code	F = Female M = Male
Major_c	Major code	EAS = Aerospace Engineering EASA = Aerospace Engineering Astronautics EEE = Electrical Engineering EGE = General Engineering EME = Mechanical Engineering ENA = Naval Architecture

		EOE = Ocean Engineering ESE = Systems Engineering ESP = Marine Engineering FEC = Economics FECH = Economics Honors FPS = Political Science FPSH = Political Science Honors HEG = English HEGH = English Honors HHS = History HASH = History Honors SAS = Applied Science SCH = Chemistry SCS = Computer Science SGS = General Science SMA = Mathematics SMAA = Mathematics Specialty SMAC = Mathematics Specialty 2 SMAH = Mathematics Honors SOC = Oceanography SOCH = Oceanography Honors SPH = Physics SPS = Physical Science SQE = Quantitative Economics UND = Undeclared
Major_grp	Major group	I = Engineering II = Science/Math III = Humanities/Social Science
Major_qpr		0 – 4
Prior	Prior enlisted	Y = Yes N = No
Varsity	Varsity athletics	Y = Yes N = No
Failed_prt	Failed physical readiness test	# = number of failed attempts
Conduct_v	Conduct violations	# = number of violations

A. STAGE 1: SUPPORTING TABLES

Table 12: Graduation Year Frequencies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2000	1117	16.2	16.2	16.2
	2001	1084	15.7	15.7	31.9
	2002	1155	16.7	16.7	48.6
	2003	1152	16.7	16.7	65.3
	2004	1167	16.9	16.9	82.2
	2005	1230	17.8	17.8	100.0
	Total	6905	100.0	100.0	

Table 13: Attrition Frequencies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	5809	84.1	84.1	84.1
	1	1096	15.9	15.9	100.0
	Total	6905	100.0	100.0	

Table 14: Graduation Year Cross-Tabulation

		1=attrite, 0=all other		Total
		0	1	
Recode_for_Analysis	2000	947	170	1117
	2001	923	161	1084
	2002	977	178	1155
	2003	988	164	1152
	2004	999	168	1167
	2005	975	255	1230
Total		5809	1096	6905

Table 15: Graduation Year Chi-Square

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	27.351(a)	5	.000
Likelihood Ratio	25.934	5	.000
Linear-by-Linear Association	25.724	1	.000
N of Valid Cases	6905		

Table 16: Graduation Year Chi-Square Without 2005

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.939(a)	4	.919
Likelihood Ratio	.940	4	.919
Linear-by-Linear Association	.276	1	.599
N of Valid Cases	5675		

Table 17: Cohort 2005 Minority Cross-Tabulation

		1=attrite, 0=all other		Total
		0	1	
Is the case a minority	White	782	183	965
	Minority	193	72	265
Total		975	255	1230

Table 18: Cohort 2005 Minority Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	8.519(b)	1	.004		
Continuity Correction(a)	8.027	1	.005		
Likelihood Ratio	8.122	1	.004		
Fisher's Exact Test				.005	.003
Linear-by-Linear Association	8.512	1	.004		
N of Valid Cases	1230				

Table 19: Cohort 2005 Gender Cross-Tabulation

		1=attrite, 0=all other		Total
		0	1	
Gender	Male	827	209	1036
	Female	148	46	194
Total		975	255	1230

Table 20: Cohort 2005 Gender Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.244(b)	1	.265		
Continuity Correction(a)	1.038	1	.308		
Likelihood Ratio	1.211	1	.271		
Fisher's Exact Test				.288	.154
Linear-by-Linear Association	1.243	1	.265		
N of Valid Cases	1230				

Table 21: Cohort 2005 Accession Source Cross-Tabulation

		1=attrite, 0=all other		Total
		Not Attrite	Attrite	
Accession_Source	High School Student	756	180	936
	All other sources	219	75	294
Total		975	255	1230

Table 22: Cohort 2005 Accession Source Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.368(b)	1	.021		
Continuity Correction(a)	4.993	1	.025		
Likelihood Ratio	5.186	1	.023		
Fisher's Exact Test				.026	.014
Linear-by-Linear Association	5.364	1	.021		
N of Valid Cases	1230				

Table 23: Cohort 2005 Major Level Cross-Tabulation

		1=attrite, 0=all other		Total
		0	1	
Major level	Undeclared	0	77	77
	Group 1	320	45	365
	Group 2	250	52	302
	Group 3	405	81	486
Total		975	255	1230

Table 24: Cohort 2005 Major Level Chi-Square

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	317.249(a)	3	.000
Likelihood Ratio	267.552	3	.000
Linear-by-Linear Association	10.073	1	.002
N of Valid Cases	1230		

Table 25: Cohort 2005 Prior Enlisted Service Cross-Tabulation

		1=attrite, 0=all other		Total
		0	1	
1=Prior	No Prior Service	895	226	1121
	Prior Service	80	29	109
Total		975	255	1230

Table 26: Cohort 2005 Prior Enlisted Service Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.511(b)	1	.113		
Continuity Correction(a)	2.134	1	.144		
Likelihood Ratio	2.374	1	.123		
Fisher's Exact Test				.137	.075
Linear-by-Linear Association	2.509	1	.113		
N of Valid Cases	1230				

Table 27: Cohort 2005 Varsity Athlete Cross-Tabulation

		1=attrite, 0=all other		Total
		0	1	
1=Varsity	0	504	155	659
	1	471	100	571
Total		975	255	1230

Table 28: Cohort 2005 Varsity Athlete Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.718(b)	1	.010		
Continuity Correction(a)	6.358	1	.012		
Likelihood Ratio	6.772	1	.009		
Fisher's Exact Test				.011	.006
Linear-by-Linear Association	6.713	1	.010		
N of Valid Cases	1230				

Table 29: Cohort 2005 Failed Physical Readiness Test Cross-Tabulation

		1=attrite, 0=all other		Total
		0	1	
1 = failed PRT	0	765	155	920
	1	210	100	310
Total		975	255	1230

Table 30: Cohort 2005 Failed Physical Readiness Test Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	33.506(b)	1	.000		
Continuity Correction(a)	32.575	1	.000		
Likelihood Ratio	31.304	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	33.479	1	.000		
N of Valid Cases	1230				

Table 31: Cohort 2005 Conduct Violations Cross-Tabulation

		1=attrite, 0=all other		Total
		0	1	
1 or more violations	0	674	161	835
	1	301	94	395
Total		975	255	1230

Table 32: Cohort 2005 Conduct Violations Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.328(b)	1	.068		
Continuity Correction(a)	3.059	1	.080		
Likelihood Ratio	3.271	1	.071		
Fisher's Exact Test				.071	.041
Linear-by-Linear Association	3.325	1	.068		
N of Valid Cases	1230				

Table 33: Cohort 2000-4 Minority Cross-Tabulation

		1=attrite, 0=all other		Total
		0	1	
Is the case a minority	White	3994	623	4617
	Minority	840	218	1058
Total		4834	841	5675

Table 34: Cohort 2000-4 Minority Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	34.483(b)	1	.000		
Continuity Correction(a)	33.922	1	.000		
Likelihood Ratio	32.131	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	34.477	1	.000		
N of Valid Cases	5675				

Table 35: Cohort 2000-4 Gender Cross-Tabulation

		1=attrite, 0=all other		Total
		0	1	
Gender	Male	4107	659	4766
	Female	727	182	909
Total		4834	841	5675

Table 36: Cohort 2000-4 Gender Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	23.209(b)	1	.000		
Continuity Correction(a)	22.720	1	.000		
Likelihood Ratio	21.680	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	23.205	1	.000		
N of Valid Cases	5675				

Table 37: Cohort 2000-4 Accession Scource Cross-Tabulation

		1=attrite, 0=all other		Total
		Not Attrite	Attrite	
Accession_Source	High School Student	3732	607	4339
	All other sources	1102	234	1336
Total		4834	841	5675

Table 38: Cohort 2000-4 Accession Source Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10.058(b)	1	.002		
Continuity Correction(a)	9.781	1	.002		
Likelihood Ratio	9.743	1	.002		
Fisher's Exact Test				.002	.001
Linear-by-Linear Association	10.056	1	.002		
N of Valid Cases	5675				

Table 39: Cohort 2000-4 Major Level Cross-Tabulation

		1=attrite, 0=all other		Total
		0	1	
Major level	Undeclared	0	262	262
	Group 1	1671	134	1805
	Group 2	1167	159	1326
	Group 3	1996	286	2282
Total		4834	841	5675

Table 40: Cohort 2000-4 Major Level Chi-Square

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1602.017(a)	3	.000
Likelihood Ratio	1112.217	3	.000
Linear-by-Linear Association	20.734	1	.000
N of Valid Cases	5675		

Table 41: Cohort 2000-4 Prior Enlisted Service Cross-Tabulation

		1=attrite, 0=all other		Total
		0	1	
1=Prior	No Prior Service	4495	763	5258
	Prior Service	339	78	417
Total		4834	841	5675

Table 42: Cohort 2000-4 Prior Enlisted Service Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.383(b)	1	.020		
Continuity Correction(a)	5.056	1	.025		
Likelihood Ratio	5.068	1	.024		
Fisher's Exact Test				.026	.014
Linear-by-Linear Association	5.382	1	.020		
N of Valid Cases	5675				

Table 43: Cohort 2000-4 Varsity Athletes Cross-Tabulation

		1=attrite, 0=all other		Total
		0	1	
1=Varsity	0	2415	471	2886
	1	2419	370	2789
Total		4834	841	5675

Table 44: Cohort 2000-4 Varsity Athletes Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10.478(b)	1	.001		
Continuity Correction(a)	10.237	1	.001		
Likelihood Ratio	10.504	1	.001		
Fisher's Exact Test				.001	.001
Linear-by-Linear Association	10.476	1	.001		
N of Valid Cases	5675				

Table 45: Cohort 2000-4 Failed PRT Cross-Tabulation

		1=attrite, 0=all other		Total
		0	1	
1 = failed PRT	0	3941	442	4383
	1	893	399	1292
Total		4834	841	5675

Table 46: Cohort 2000-4 Failed PRT Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	341.930(b)	1	.000		
Continuity Correction(a)	340.285	1	.000		
Likelihood Ratio	298.826	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	341.870	1	.000		
N of Valid Cases	5675				

Table 47: Cohort 2000-4 Conduct Violations Cross-Tabulation

		1=attrite, 0=all other		Total
		0	1	
1 or more violations	0	3505	568	4073
	1	1329	273	1602
Total		4834	841	5675

Table 48: Cohort 2000-4 Conduct Violations Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	8.729(b)	1	.003		
Continuity Correction(a)	8.485	1	.004		
Likelihood Ratio	8.530	1	.003		
Fisher's Exact Test				.004	.002
Linear-by-Linear Association	8.727	1	.003		
N of Valid Cases	5675				

B. STAGE 2: SUPPORTING TABLES

Table 49: Minority Frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	White	5582	80.8	80.8	80.8
	Minority	1323	19.2	19.2	100.0
	Total	6905	100.0	100.0	

Table 50: Minority Cross-Tabulation

		1=attrite, 0=all other		Total
		0	1	
Is the case a minority	White	4776	806	5582
	Minority	1033	290	1323
Total		5809	1096	6905

Table 51: Minority Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	44.820(b)	1	.000		
Continuity Correction(a)	44.262	1	.000		
Likelihood Ratio	41.915	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	44.814	1	.000		
N of Valid Cases	6905				

Table 52: Gender Frequencies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	5802	84.0	84.0	84.0
	Female	1103	16.0	16.0	100.0
	Total	6905	100.0	100.0	

Table 53: Gender Cross-Tabulation

		1=attrite, 0=all other		Total
		0	1	
Gender	Male	4934	868	5802
	Female	875	228	1103
Total		5809	1096	6905

Table 54: Gender Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	22.634(b)	1	.000		
Continuity Correction(a)	22.208	1	.000		
Likelihood Ratio	21.345	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	22.631	1	.000		
N of Valid Cases	6905				

Table 55: Prior Enlisted Frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No Prior Service	6379	92.4	92.4	92.4
	Prior Service	526	7.6	7.6	100.0
	Total	6905	100.0	100.0	

Table 56: Prior Enlisted Cross-Tabulation

		1=attrite, 0=all other		Total
		0	1	
1=Prior	No Prior Service	5390	989	6379
	Prior Service	419	107	526
Total		5809	1096	6905

Table 57: Prior Enlisted Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	8.518(b)	1	.004		
Continuity Correction(a)	8.160	1	.004		
Likelihood Ratio	7.999	1	.005		
Fisher's Exact Test				.004	.003
Linear-by-Linear Association	8.517	1	.004		
N of Valid Cases	6905				

Table 58: Feeder Source Frequencies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High School Student	5275	76.4	76.4	76.4
	All other sources	1630	23.6	23.6	100.0
	Total	6905	100.0	100.0	

Table 59: Feeder Source Cross-Tabulation

		1=attrite, 0=all other		Total
		0	1	
Accession_Source	High School Student	4488	787	5275
	All other sources	1321	309	1630
Total		5809	1096	6905

Table 60: Feeder Source Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	15.202(b)	1	.000		
Continuity Correction(a)	14.902	1	.000		
Likelihood Ratio	14.708	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	15.200	1	.000		
N of Valid Cases	6905				

Table 61: Major Groups Frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Undeclared	339	4.9	4.9	4.9
	Group 1	2170	31.4	31.4	36.3
	Group 2	1628	23.6	23.6	59.9
	Group 3	2768	40.1	40.1	100.0
	Total	6905	100.0	100.0	

Table 62: Major Groups Cross-Tabulation

		1=attrite, 0=all other		Total
		0	1	
Major level	Undeclared	0	339	339
	Group 1	1991	179	2170
	Group 2	1417	211	1628
	Group 3	2401	367	2768
Total		5809	1096	6905

Table 63: Major Groups Chi-Square

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1915.714(a)	3	.000
Likelihood Ratio	1384.782	3	.000
Linear-by-Linear Association	30.507	1	.000
N of Valid Cases	6905		

Table 64: Varsity Sports Frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	3545	51.3	51.3	51.3
	1	3360	48.7	48.7	100.0
	Total	6905	100.0	100.0	

Table 65: Varsity Sports Cross-Tabulation

		1=attrite, 0=all other		Total
		0	1	
1=Varsity	0	2919	626	3545
	1	2890	470	3360
Total		5809	1096	6905

Table 66: Varsity Sports Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	17.405(b)	1	.000		
Continuity Correction(a)	17.131	1	.000		
Likelihood Ratio	17.468	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	17.403	1	.000		
N of Valid Cases	6905				

C. STAGE 3: SUPPORTING TABLES

1. Demographic Regression

Table 67: Demographic Regression Variables

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1(a)	Minority	.500	.077	42.512	1	.000	1.649
	Gender	.380	.083	20.785	1	.000	1.462
	Constant	-1.845	.041	1991.582	1	.000	.158

Table 68: Demographic Regression Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	5980.824(a)	.009	.015

2. Background Regression

Table 69: Background Regression Variables

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1(a)	Minority	.467	.079	35.057	1	.000	1.595
	Gender	.410	.084	23.872	1	.000	1.506
	Accession_Source	.150	.085	3.138	1	.077	1.162
	Prior_Enl	.273	.128	4.548	1	.033	1.313
	Constant	-1.904	.045	1758.853	1	.000	.149

Table 70: Background Regression Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	5967.823(a)	.011	.018

3. Academy Experiences Regression

Table 71: Academy Experiences Regression Variables

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1(a)	Minority	.035	.098	.128	1	.721	1.036
	Gender	.550	.107	26.618	1	.000	1.733
	Accession_Source	-.378	.104	13.274	1	.000	.685
	Prior_Enl	.542	.156	12.082	1	.001	1.719
	Major	-.003	.001	10.656	1	.001	.997
	Varsity_Ath	-.168	.085	3.954	1	.047	.845
	Any_Violation	.251	.086	8.561	1	.003	1.285
	PRT_Failure	.841	.091	85.395	1	.000	2.318
	caqpr	-2.783	.101	756.094	1	.000	.062
	Constant	5.361	.281	364.656	1	.000	212.884

Table 72: Academy Experiences Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	3885.788(a)	.194	.354

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF REFERENCES

Alexander, K., Entwisle, D., & Kabbani, N. (2001). The dropout process in life course perspective: Early risk factors at home and school. Teachers College Record, 103, 760-822.

Bayer, A. E. (1968, Summer). The college drop-out: Factors affecting senior college completion. Sociology of Education, 41, 305-316.

Erikson, E.H. (1968). Identity: Youth and crisis. New York: Norton.

Gale, S. F. (2002, April). Three companies cut turnover with tests. Workforce, 81(4), 66-68.

Golding, L. W., & Griffis, H. S. (2003, July). Increased PERSTEMPO, retention, and Navy policy. Alexandria, VA: Center for Naval Analysis.

Harvey, C. (2003). The influence of varsity athletics on midshipman performance. Unpublished Master's thesis, Naval Postgraduate School, Monterey, CA.

Hackman, J.R., & Dysinger W.S., (1970). Commitment to college as a factor in student attrition. Sociology of Education, 43(3), 311-324.

Hollenbach, M. P. (2003). Predictors of plebe summer attrition at the United States Naval Academy. Unpublished Master's thesis, Naval Postgraduate School, Monterey, CA.

Laurence, J.H., Naughton, J.A., Harris, D.A. (1995, January). Attrition revisited: Identifying the problem and its solutions (FR-PRD-95-01). Alexandria, VA: Human Resources Research Organization.

Landry, C.C., (2002/2003). Retention of women and people of color: Unique challenges and institutional responses. Journal of College Student Retention, 4(1), 1-13.

Leung, L. (2002). Loneliness, self-discloure, and ICQ ("I Seek You") use. Cyber Psychology and Behavior, 5, 241-251.

Low, J. M., Williamson, D., & Cottingham, J. (2004). Predictors of university lawbreaking behaviors. Journal of College Student Development, 45(5), 535-548.

Mangum W. M., & Baugher D., Winch, J. K., & Varanelli, A. (2005, March – April). Longitudinal study of student dropout from a business school. Journal of Education for Business. 80(4), 218-221.

Marcia, J.E. (1993). The status of the statuses: Research review. In J.E> Marcia, A. S. Waterman, D. R. Matteson, S. L. Archer, & J. L. Orlofsky (Eds.), Ego identity: A handbook for psychosocial research. (pp. 22-41). New York: Springer-Verlag.

McGaha, V., & Fitzpatrick, J. (2005). Personal and social contributors to dropout risk for undergraduate students. College Student Journal, 39(2). 287-297.

Miller, J. & deWinstanley, P. (2002). The role of interpersonal competence in memory for conversation. Personality and Social Psychology Bulletin, 28, 78-89.

Neto, F. & Barros, J. (2000). Psycholsocial concomitants of loneliness among students of Cape Verde and Protugal. Journal of Psychology, 134, 503-514.

Pascarella, E. T., & Terenzini, P. T. (2005). How college affects students: A third decade of research. San Francisco, CA: John Wiley and Sons

Pizzolato, J. E. (2004), Coping with conflict: Self-authorship, coping, and adaptation to college in first-year, high-risk students. Journal of College Student Development, 45(4), 425-442.

Rankin, S., & Reason, R. D. (2005). Differing perceptions: How students of color and white students perceive campus climate for underrepresented groups. Journal of College Student Development, 46(1), 43-61.

Richard, A. (2005, November 2). Researchers tally costs of education failings. *Education Week*, 25(10), 6.

Santos S.J., & Reigadas E.T. (2004-2005). Understanding the student-faculty mentoring process: Its effects on at-risk university students. *Journal of College Student Retention*. 6(3), 337-357.

Smith J.S., (2004-2005). The effects of student receptivity on college achievement and retention. *Journal of College Student Retention*. 6(3), 273-288.

United States Naval Academy (2003-4). *United States Naval Academy Data Book, 2003-2004.* Retrieved February 20, 2006, from the Naval Academy Web site: http://www.usna.edu/IR/restricted/data_book/htmls/databook.html

United States Naval Academy (2006). *United States Naval Academy catalog, 2005-2006.* Retrieved March 21, 2006, from the Naval Academy Web site: http://www.usna.edu/Catalog

Waterman, A. (1985). Identity in the context of adolescent psychology. In A. S. Waterman (Ed.), New Directions for Child Development, No. 30, pp. 5-24. San Francisco: Jossey-Bass.

INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center
   Ft. Belvoir, Virginia

2. Dudley Knox Library
   Naval Postgraduate School
   Monterey, California

3. Nimitz Library
   United States Naval Academy
   Annapolis, Maryland

4. Superintendent
   United States Naval Academy
   Annapolis, Maryland

5. Commandant of Midshipmen
   United States Naval Academy
   Annapolis, Maryland

6. Office of Institutional Research
   United States Naval Academy
   Annapolis, Maryland

7. Professor Janice H. Laurence, Ph.D.
   Office of the Under Secretary of Defense (Personnel & Readiness)
   Washington, DC

8. Professor Linda Mallory, Ed.D.
   United States Naval Academy
   Annapolis, Maryland

9. Capt James W. Bishop, USMC
   Commandant's Staff
   United States Naval Academy
   Annapolis, Maryland